Mechanics and Machines
HW-SSA1

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Model description.

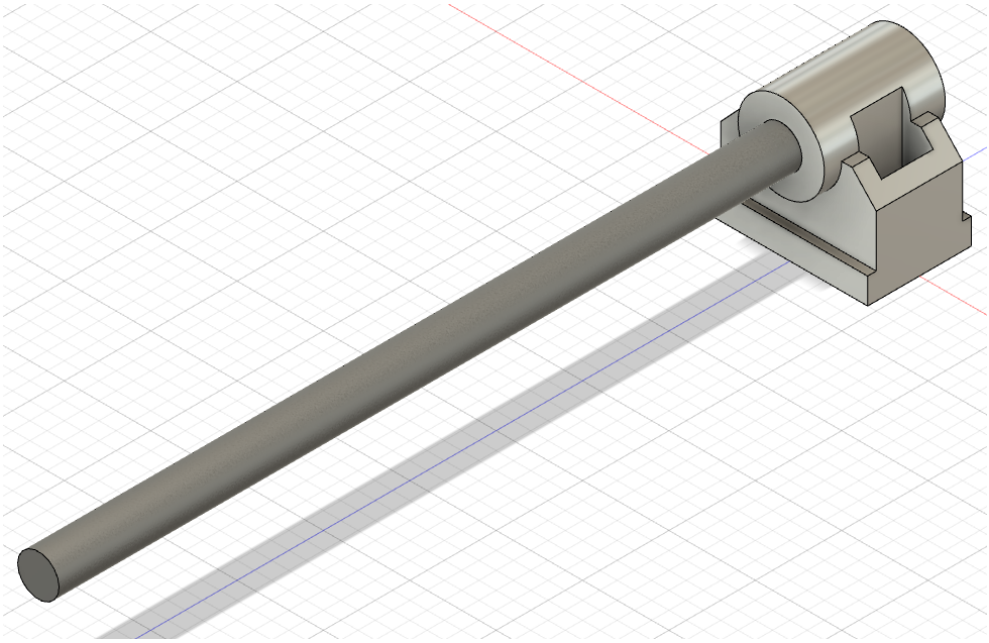

Figure 1: 3D model

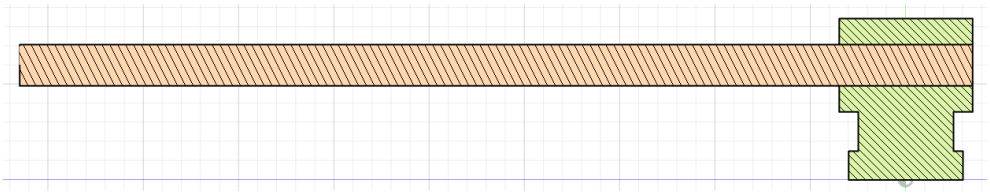

Figure 2: Section analysis

We have aluminium detail that contains the hole. Inside this hole we put steel rode 500 mm long and apply 1000 N force at the end of the rode.

Task 1.

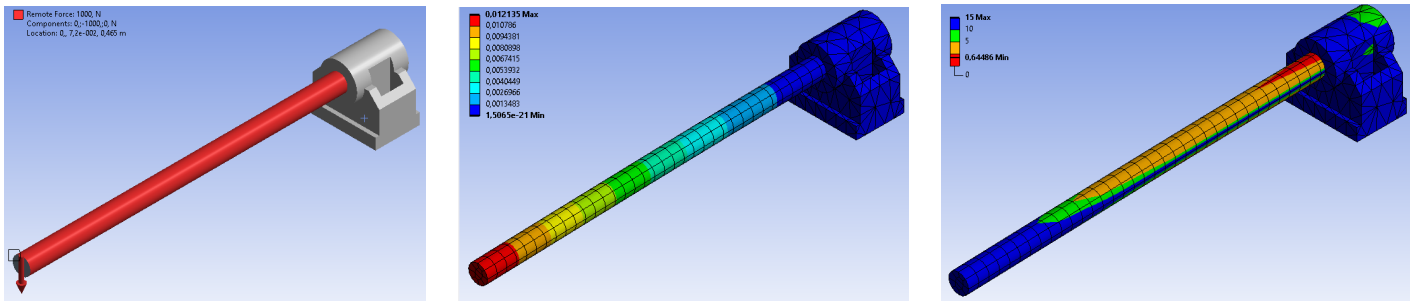

Figure 3: Applied force, deformation (m) and safety factor.

In the $1st$ task we apply 1000 N at the very end of the rode. As we can see, the rod bends and eventually breaks due to the applied force. Nevertheless, the body does not break.

Task 2.

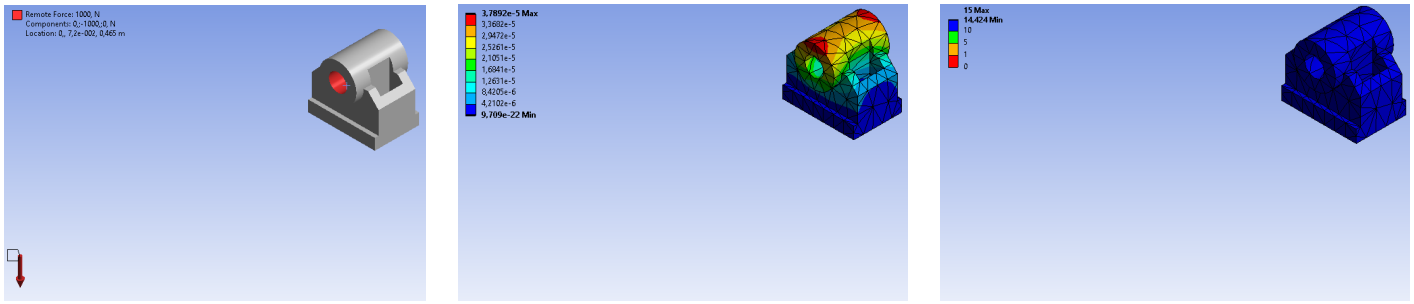

Figure 4: Applied force, deformation (m) and safety factor.

In the $2nd$ task we apply remote force to the inner surface of the body but at the same distance as for the rod. In this case we can see that the force affects the body and deformation occurred. However, the magnitude of deformation of the body is much less than deformation of the rod. Moreover, applied force does not break the body itself.

Task 3.

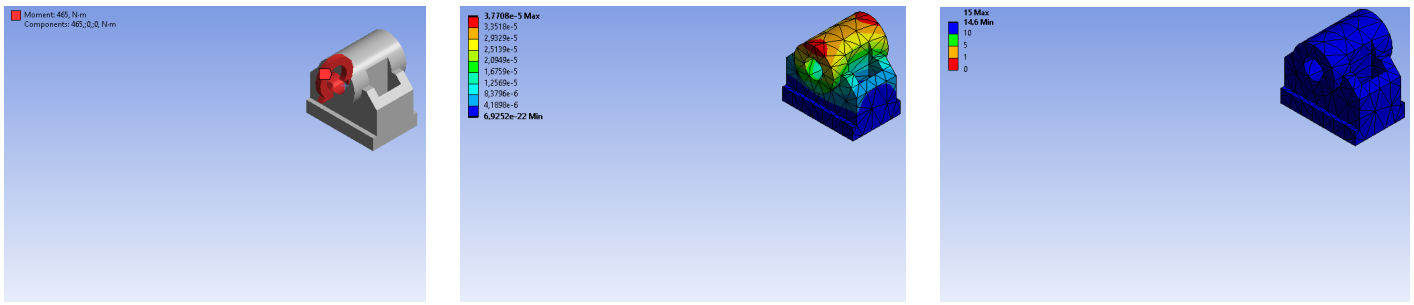

Figure 5: Applied force, deformation (m) and safety factor.

In the $3rd$ task we apply moment to the inner surface of the body. Using measurements from the $1st$ task we know that this moment equals to 465 $N \cdot m$. In this case we see the same situation as in $2nd$ task: deformation of the body occurred and according to the numbers, the deformation is almost the same as deformation caused by the remote force in $2nd$ task. And the body does not break as well as in $2nd$ task.